

## Auto Fluff and Landfill estimates

### PBDEs in Vehicles

Material	Lbs/Car	% PBDEs/material <sup>1</sup>	Lbs PBDEs/material
Polyurethane Seat Foam	24	3-18% Penta-BDE (through 2004) (Alaee et al. 2003; VCCEP 2003b)	0.7-4.3
Plastics			
Polypropylene	34	10-15% Deca-BDE (ATSDR 2004)	3.4-5.1
ABS	20	12-18% Octa-BDE (through 2004) (Alaee et al. 2003; VCCEP 2003a)	2.4-3.6
Nylon	16	10-15% Deca-BDE (ATSDR 2004) Octa-BDE may have been used as an additive FR (ATSDR 2004)	1.6-2.5
Polycarbonate	7	Deca-BDE (OECD 1995); Octa-BDE may have been used as an additive FR (ATSDR 2004)	Unknown loading
Elastomers	67	10-15% Deca-BDE; Octa-BDE may have been used as an additive FR (ATSDR 2004)	6.7-10.1
Glass	89	NA	
Textiles	20	18-27% Deca-BDE (Lowell 2005)	3.6-5.4
<b>Total: Average ASR</b>	600		
<b>Total: Typical Vehicle</b>	3,114		19.1-31.9

### Vehicle Scrappage and Recycling<sup>2-3</sup>

Vehicles Scrapped in U.S. (2004)	11,903,000
Vehicles Scrapped in WA (2004) (assumes 2.69% of total)	319,893
Total Vehicles Scrapped in the U.S., 1990-2004	178,172,000
Total in WA (assumes 2.69% of total)	4,788,000
Total Estimated Vehicles Scrapped in the U.S., 1970-2004	352,372,000
Total in WA (assumes 2.69% of total)	9,470,000

### Auto Fluff Estimate

<sup>1</sup> Other flame retardant chemicals are used for each of these materials. However, specific figures on how often PBDEs were/are used in each material are not available with the exception of polyurethane foam. Approximately 7.5% of polyurethane foam once used commercial Penta-BDE (ATSDR 2004)

<sup>2</sup> Data from U.S. DOT National Transportation Statistics, 2005; and

<sup>3</sup> Great Lakes Institute for Recycling Markets. 1998. Auto Recycling Demonstration Project. Prepared for Michigan Department of Environmental Quality and U.S. EPA.

	Low Estimate	High Estimate
PBDEs in Vehicles, lbs.	19.1	31.9
Vehicles Scrapped in WA (2004)	319,893	319,893
Est. PBDEs in auto fluff (2004), lbs.	6,109,956	10,204,587

### Landfill Estimate

	Low Estimate	High Estimate
PBDEs in Vehicles, lbs.	19.1	31.9
Total Estimated Vehicles Scrapped in the U.S., 1970-2004	352,372,000	352,372,000
Total in WA (assumes 2% of total)	7,047,440	7,047,440
Est. PBDEs in landfilled auto fluff, lbs.	134,606,104	224,813,336

### TVs in use estimate

			source
"average" TV size	27.5	inches	US Consumer Electronics Assoc. (Lowell Report, p.11)
weight of housing of "average" TV	12	lbs.	US Consumer Electronics Assoc. (Lowell Report, p.11)
DecaBDE in housing	0.12		US Consumer Electronics Assoc. (Lowell Report, p.11)
Deca use in rear TV covers began in 1987-1990.			Tasaki, T. et al., Substance flow analysis of brominated flame retardants and related compounds in waste TV sets in Japan

**DecaBDE in TVs calculation**

<b>Year</b>	<b># new TVs in WA<sup>4</sup></b>	<b>lbs. DecaBDE</b>
1990	206,698	297,645
1991	167,524	241,234
1992	142,764	205,580
1993	148,787	214,253
1994	130,097	187,339
1995	137,821	198,463
1996	133,072	191,624
1997	133,521	192,271
1998	127,052	182,955
1999	123,975	178,525
2000	110,278	158,801
2001	147,988	213,103
2002	137,565	198,094
2003	130,015	187,222
2004	143,397	206,492
2005	163,534	235,489
2006	172,192	247,956
<b>Total</b>		<b>3,537,045</b>

**Carpet Padding Estimate<sup>5</sup>**

	<b>Annual take-up scrap nationally, pounds</b>	<b>avg. Penta content of take-up foam</b>	<b>Annual estimated Penta content in take-up scrap nationally, pounds</b>	<b>WA pop. as percent of national</b>	<b>Annual estimated Penta content in take-up scrap in WA, pounds</b>
Low est.	300,000,000	0.00313	939,000	0.0211	19,813
High est.	400,000,000	0.00313	1,252,000	0.0211	26,417

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<sup>4</sup> WA Dept. of Ecology, internal document, projection developed for e-waste project

<sup>5</sup> Carpet Cushion Council

**Mattress Estimate<sup>6</sup> - assumes only BFR used is Deca**

% mattresses that currently meet CPSC standard sold in WA	0.15	0.2
range- lbs. BFR/mattress	0.311	0.325
annual mattresses disposed, 2014 - 2018	500,000	500,000
annual contribution of BFRs from mattresses, lbs., 2014 - 2018, assuming 25% have BFRs	39,000	41,000
est. BFRs in mattresses sold in WA currently	5,850	8,200

**Biosolids Estimate**

	<b>Annual dry tons</b>	<b>Total Penta-like PBDEs, lbs., low estimate (Hale)</b>	<b>Total Penta-like PBDEs, lbs., high estimate (Hale)</b>	<b>annual est. of BDE-209 in biosolids (low), lbs.</b>	<b>annual est. of BDE-209 in biosolids (high), lbs.</b>	<b>annual est. of total PBDEs in biosolids (low), lbs.</b>	<b>annual est. of total PBDEs in biosolids (high), lbs.</b>
Land Applied	83,280	183	381	14.12	814	197	1,196
Landfill Cover	2,956	7	14	0.50	29	7	42
Incinerated	15,709	35	72	2.66	154	37	226
Disposed in Landfill	1,732	4	8	0.29	17	4	25
TOTAL:						246	1,489

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<sup>6</sup> CPSC